EXHIBIT “B”

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

IN RE:	)	
	)	Case No.
TESLA, INC., SECURITIES LITIGATION	)	18-cv-04865-EMC
	)	

****
REMOTE VIDEOTAPED DEPOSITION OF
MICHAEL HARTZMARK
March 18, 2022
****

MICHAEL HARTZMARK, produced as a witness at the instance of the Plaintiffs, was duly sworn and deposed in the above-styled and numbered cause on March 18, 2022, from 8:39 a.m. to 6:28 p.m. CST, stenographically reported, pursuant to the Federal Rules of Civil Procedure and the provisions stated on the record.

Reported by: Rebecca A. Graziano, CSR, RMR, CRR
Texas CSR 9306
California CSR 14407
Illinois CSR 084.004659

A P P E A R A N C E S

(all attendees appearing via remote videoconference)

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ALSO PRESENT:

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THE VIDEOGRAPHER:

Mr. Paul D'Ambra

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PROCEEDINGS
(On the record at 8:39 a.m. CST)
THE VIDEOGRAPHER: We are now on the record. Today's date is March 18th, 2022. The time is 9:39 a.m. Eastern.
This is the recorded video deposition of Michael Hartzmark in the matter of in re Tesla, Incorporated, securities litigation in the United States District Court, Northern District of California, Case Number 18-cv-04865-EMC.
My name is Paul D'Ambra from Everest Court Reporting. I'm the video specialist. Our court reporter today is Becky Graziano, also with Everest. All counsel appearing today will be noted on the stenographic record.
Will the court reporter please swear in the witness.
(Witness duly sworn.)
MICHAEL HARTZMARK,
being first duly sworn, testified as follows:
EXAMINATION
BY MR. ROSSMAN:
Q Very good. Good morning again,

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Dr. Hartzmark. Nice to see you.
I understand from correspondence with counsel that you have some of your materials in front of you on paper, and I want to take a minute just to identify them for the record.
(Heston Exhibit 375 tendered.)
BY MR. ROSSMAN:
Q Exhibit -- previously marked Exhibit 375 is the "Expert Damages Report of Michael L. Hartzmark, PhD, November 10, 2021," with appendices.
Do you have that handy, sir?
A The -- I have with me -- yes. And I have it separate, the expert damages report that you referenced. Correct.
Q Yup.
A And then just to make life easier, I have a separate set of appendices.
Q Perfect.
A So, yes, I have that.
Q So I'll refer to them as "your damages report and your appendices."
MR. ROSSMAN: For the benefit of the record, it's Exhibit 375. And for Paul's benefit, it's Tab 1.

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(Heston Exhibit 1 tendered.)
BY MR. ROSSMAN:
Q You also have with you your class certification report, which has been previously marked as Exhibit 1. This is the report of Michael L. Hartzmark, PhD, September 22, 2020?
A It's been a long time, but yes, I have, in a notebook off my desk, if you want me -- when we get to it, I'll -- if we get to it. This -- this also has a series of appendices as well as a series of exhibits, and in this particular case, I have them all as one document.
Q Terrific. You are a prepared student.
So we're going to refer to your September 22, 2020, report. I'll call it the "class certification report and appendices" when you and I are speaking. For the benefit of the record, that's Exhibit 1.
MR. ROSSMAN: And, Paul, that's going to be Tab 2. I believe also for your benefit, the appendices to the damages report, the appendices to Exhibit 375, you have handy at Tab 3. So if need be, I'll direct you to that.

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BY MR. ROSSMAN:
Q Okay. Hopefully --
A And --
Q -- we're ready.
A Excuse me. One question. When you say "Tab 1," "Tab 2," are you referring to the -- I have next to me a separate monitor which has -- which is now into the "Elevated Exhibits at Everest Court Reporting." Is that the tabs that you're referring to or --
Q Yes.
A Okay. So if I hit the "introduced" -- well, it says here the folder is empty. But I guess when you populate the folder, those will be the tabs that you're referring to. Should I --
Q Correct. And they'll actually be populated to you, I believe -- okay, I'll be corrected by more technically minded folks than me if I'm wrong about this, but I believe they'll be populated to you by exhibit number as they're marked by the report.
A Okay.
Q It will be -- it will be very clear -- I think most of the day, we're going to spend on the documents that you have on paper in front of you.

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I've read here and based on an analysis that I haven't done -- it was done by Mr. Fischel -- that to the extent that it was prior stated that Mr. Musk wanted to take Tesla private, to the extent that a normal premium of 20 -- of 420 -- which would have equated to 420 would have been considered reasonable by market participants, then, yes, it would have been in the price.

But I have no opinion -- I'm telling you -- I've told you -- it's based on Compass Lexecon's professional staff and Mr. Fischel's analysis. Because I haven't been asked to separate these issues. I think I told you maybe two dozen times, this is an interwoven bundle of issues.

BY MR. ROSSMAN:

Q Okay. Well, you have an opinion, if I understand you correctly -- you stated it multiple times. You have an opinion that there was news provided to the marketplace that the securities reacted to in that 12:48 tweet; right? You've given us that opinion.

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A I've given you that opinion on the basis of qualitative analysis, which included analyst reports, TV output, other media, newspapers, included a total anomalous substantial change in implied volatility, that looked at a change in the levels of all volatility, that looked at a statistically significant price movement.

Yes, I've supported my opinion that there was news associated with this interwoven bundle of Musk tweets.

Q Okay. And I think I am entitled to a straight answer, Dr. Hartzmark.

A What was wrong with my answer?

Q Let me put my question forward. Okay? I think I'm entitled to a straightforward answer to the question of whether or not the $420 offer price in the tweet was something that you believe the market reacted to or you take the position that you believe the market didn't react to that information.

A I'm not going to believe --

MR. PORRITT: Object to form.

THE WITNESS: I'm not going to believe or speculate. Again, to the extent that Mr. Musk wanted to take his

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company private, to the extent that it's normal and reasonable to provide a 20 percent premium, that would be incorporated into the price.

BY MR. ROSSMAN:

Q Okay. Now, you -- one of the things you looked at was the trading of options in Tesla securities; right?

A Yes. I examined Tesla options.

Q And could we look at your Appendix 8, please, sir?

A Are we done with Fischel? Can I put it away?

Q Yes.

Okay. And I just want to get oriented.

MR. ROSSMAN: We can get Appendix 8, when you can, on the screen. Yeah, you'll probably -- there's probably some references to it. There we go. Okay.

BY MR. ROSSMAN:

Q Just so we understand what's here, okay, Appendix 8, am I right to understand, is your "Calculation of End-of-Day Artificial Inflation Or

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Deflation in Tesla Options;" right?

A Well, not all of them. It's specifically for strike prices at $300, $340, $380, $420, $460, and $500.

Q Okay. So by the way, one of the options -- before we get into the mechanics of this spreadsheet, one of the strike prices was $420, which was the number that Mr. Musk mentioned in his tweet on August 7th. Okay?

Do you agree with me that there would have been a different impact to the trading of the 420 strike price option if Mr. Musk had announced that he was considering taking Tesla private at $430, or alternatively at $410, compared to what he actually said for the first time on August 7th at 12:48, $420?

A I can't answer that. First of all, it's a long question late in the day.

Would it be different if he had announced 410 versus 430 versus 420?

Q Yeah. If instead of 420 he had announced that at 410 or 430, would you agree with me that that would have had a different impact on the trading of options in Tesla securities? At least some of it.

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A You know, I -- I guess I would -- whether it would be a material impact, I can't opine. I haven't done that analysis. It's speculative. But to the extent that probabilities were the same, it would -- all else constant, it should lead to an impact on the price. The problem is I'm not sure if it's all else constant.

If he would have announced 410, it might have been the case that you had a lower price -- a higher probability of success, because it's less money that would be known -- would be needed, lower probability of success because of shareholder issues, which might not be -- they might not be willing to go along with it. So you really have so many moving parts. But what I can say is all else constant, a lower price should result in a lower -- a lower market price.

Q Okay. And if he had announced -- to extend this a bit, price is trading at 356, immediately pre-tweet. If he had announced to take private at $370 a share, was what he was considering, okay, that would have had a pretty different impact on the traded price of options, for example, compared to a 420 announcement; right?

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MR. PORRITT: Hold on a second. Can you just read that question back, please?

MR. ROSSMAN: I'll shorten it up.

BY MR. ROSSMAN:

Q If Mr. Musk, on the 7th, in his tweet had said he was considering taking Tesla private at $370 per share, that would have had a different impact compared to what he actually said, which is 420?

A It's -- again, all else constant, yes. But as I said before, at 370, it might be the case that the market looked at that and said, "Well, that's -- you know, that's him trying to steal the company. You know, if he's -- if funding is secured, it's going to have to be for more and he knows it." You're asking -- you've got moving probabilities, and you've got moving expected prices of 420.

Again, I can't say for sure other than, all else constant, yes, you would expect an impact.

Q So the fact that he chose $420 was a material piece of information; right?

A The fact that he chose 420?

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Q It was material; right?

A You know, I -- material -- I have not separated the 420 from the funding secured from the private -- going private. I would think -- you know, the price of a going-private transaction would be important to shareholders.

Q Okay. Now, let's take a look at your Appendix 8. If I understand, the left side of this spreadsheet has sort of bibliographic information about the options, right, that they reference Tesla, expiration date, strike price, trading date, and then you supply information about an assumed interest rate and time to maturity; right?

A Correct.

Q Okay. So then you've got essentially three panels of information. The first one is called "Revalued Fitted Option Value;" is that right?

A Yes.

Q Okay. And that's -- am I right to understand that's the starting point of your analysis; right?

A Well, that would be the -- the actual value of the options based on the

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Black-Scholes-Merton model.

Q Okay. Well, it's not the actual value of the options. It's actually a calculation done by Professor Heston based on assuming the at-the-money straddle volatility; isn't that right?

MR. PORRITT: Object to form.

THE WITNESS: It includes volatility, but it includes actual information to get a -- what he called a "revalued fitted option value."

BY MR. ROSSMAN:

Q Okay. So --

A But, yes, it is a smoothing to take -- to -- you know, to take into account issues associated with options.

Q Okay. It's not intended to reflect. So what you see, for example, you know, when you look at the very first item, $300 strike price, August 7th, you know, expiration August 10th, and you see the "Call" of 79.62 and the "Put" of zero; right?

A Yes.

Q Those aren't intended to reflect the actual traded prices in the market. Those are

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based on the refitted value that Professor Heston ascribes to them; right?
A They're based on, yes, the revalued fitted option.
Q Okay. So I shouldn't -- I think, you know, elsewhere in your reports you actually report some traded option values. What's contained in this column, revalued -- in the panel, "Revalued Fitted Option Values," are not the actual observed traded option prices on any particular day; right?
MR. PORRITT: Object to form.
THE WITNESS: They're based on that, but they are the revalued fitted option. So it's a curve smoothed. It would be like running a regression.
And --
BY MR. ROSSMAN:
Q Okay. So effectively, Professor Heston is taking information about the stock price, and then he's assuming a volatility across all the option maturities; is that right -- I'm sorry -- across all the strike prices?
MR. PORRITT: Object to form.
THE WITNESS: Yeah, I don't

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understand the question. "Assuming a volatility"?
BY MR. ROSSMAN:
Q All right. So let's try it this way. Okay? Why don't you explain to me, as you understand it, how the revalued fitted option value was derived.
A It's based on an estimate of the implied volatility, and then the implied volatility, along with the strike and the actual prices, provides a call and put price --
Q And where does that input --
A -- using the Black-Scholes-Merton model.
Q And where does that input, "Implied Volatility," come from?
A It comes from Mr. Heston's estimate using ATM forward straddles.
Q Okay. And so your -- the entire Appendix 8, okay, rests as its foundation on Professor Heston's estimate of implied volatility using at-the-money forward straddles; right?
A The model would rest on implied volatility at -- you know, to the extent this model is used, I mean, you can substitute in if you had different measures of implied volatility. You could refit

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the refitted option value.
But, yes, this is based on Professor Heston's implied volatility estimates.
Q And -- so if Professor Heston made a mistake in his model, then that mistake would be embedded in the values that are contained in your Appendix 8; right?
A If he made a mistake?
MR. PORRITT: Object to form.
BY MR. ROSSMAN:
Q If he made a mistake in his model.
A Yeah. If there's a mistake here, in my Appendix 8, then the -- you would have to correct the mistake.
Q Okay. And if Professor Heston's model were determined to be unreliable, then the information contained in your Appendix 8, likewise, would be unreliable because it rests on his model; right?
MR. PORRITT: Object to form.
THE WITNESS: Well, to the extent that these values are replaced, say, for example, with defendants' values, then the methodology and the out-of-pocket methodology to calculate damage would

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remain the same. But I rely on Professor Heston's implied volatility. And given his standing in the industry, which is, you know, unlike almost anyone else in academic finance and options pricing, I relied on him much like I rely on, say, for example, Bloomberg prices and the models associated with it.
The key here is the difference between the revalued and the but-for; in essence, the calculation of inflation.
BY MR. ROSSMAN:
Q Okay. So let's take the next step here. Okay? Just so we understand each other, you're just accepting what Professor Heston calculated from his model as the implied volatilities in the "Revalued Fitted Option Value" column; right?
A I -- I am using the implied volatility that Professor Heston calculated.
Q Okay. And then we now move to the next panel, "But-For Fitted Option Value Based on Direct and Consequential Effects." Okay?
Can you explain to me, in a way that you would explain it to the jury in this case, how you determined that?

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A Well, the -- basically, in this particular case, the but-for price is the price 312.90. And to the extent that but-for price would be determined to be another price, I use the but-for price with respect to the implied volatility, that's the but-for -- I'm sorry -- the but-for implied volatility, which is the volatility prior to the tweet.

And as you can see on -- in this particular issue, since we're in an August 10th option that's about to expire in three days, it's the same. There's no change there. So the only impact on the call and the put prices in this particular case is associated with the stock price --

Q Okay.

A -- which is -- which is denoted under but-for putted options value. There's one for the -- what would be the combination of the direct and consequential effects, and we've, I believe, talked in great length about the but-for price of 312.90, and then the but-for options price based on the direct effects of 356.30.

Q Okay. So let's try an example that might be a little bit easier because it doesn't have

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that effect of the implied volatility being the same.

So if we take a look at Page 17 of this -- I'm going to use the January 2020 option that you refer to in your report. Okay? We talked about this one before. Okay?

A The January 2020 -- yeah. Page 16 and 17?

Q Yeah. So, you know, feel free to pick -- you know, let's get on Page 17 just -- it's easier. It's the last page.

Taking the strike price of 500, that panel at the very bottom of the page on 17, okay?

A Yes.

Q "Stock Price" of 312.90, you've explained. The "Implied Volatility" of 48.65, that figure, okay, which is different than the "Implied Volatility" in the "Fitted Option Value" of 32.57 -- do you see that?

A 32.57, which is different than -- oh, I'm sorry. Yes, the implied option value for the refitted is the option value as estimated by Professor Heston. Actually, all of these are by Professor Heston based on the refitted -- or based on the ATM straddles. So that's -- 32.57 percent is the implied volatility for the revalued fitted

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option.

Q So where does the 48.65 come from in that example? Which does the "Implied Volatility" for the "But-For Fitted Value Based on Direct and Consequential Effects" come from?

A It's the implied volatility when all the direct and consequential effects are incorporated into the prices and the options, and that's August 17th when the but-for price is 312.90, and the implied volatility, based on the ATM straddles, is 48.65.

Q Okay. So you're assuming -- you're essentially pricing the change to the option value based on an assumption that, first, the stock price on the 7th should have been $3- -- $312.90 and, second, that the implied volatility should have been 48.65 percent. Am I understanding that correctly?

A Yeah. If there had been a fraud and a -- and all of the information that flowed over that period of time, that's what would be the but-for world.

Q Okay. And then can you tell me -- and you characterize this as including option value based on direct and consequential effects?

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A Correct.

Q Okay. So that includes all damages that you're asserting and that plaintiff is asserting in this case?

A It -- it includes the direct and consequential effects, which is the -- yeah. Again, with the but-for price of 312.90, I -- we've had a long discussion. I showed how I came up with the but-for price.

Q Now, if you look at the last panel, the "But-For Fitted Option Price Value Based on Direct Effects."

A Yes.

Q Explain to me where the "Stock Price" of 356.30 comes from.

A 356.30 is coming from page -- would be Table 9 has the direct but-for prices.

Q Okay. And what does that reference, 356.30? Stock price as of when?

A Pardon?

Q What -- that is the stock price as of what date and time?

A As of the close of trade on the particular 8/7, 8/8, 8/9, 8/10, et cetera.

Q Okay. So that's what you refer to in your

Table 9, is the direct but-for price?
A Yes.
Q Okay. And how about the "Implied Volatility," 50.52? What does that refer to?
A Well, to isolate the but-for world with respect to the Musk tweet where there's no consequential effects, that is the implied volatility immediately prior to the tweet.
Q Okay. So that's 12:47 p.m. on August 7th?
A Yes. I think it's -- I'm not sure whether there's seconds involved or not, but I believe it's -- yeah, 12:47 is at the one minute.
Q So why did you use the implied volatility on August 7th to assess your direct damages, but the implied volatility on August 17th to assess your consequential damages?
A Because I needed to isolate the implied volatilities and make it consistent with the prices that I was using. So the price is 312.90, which is the price on the 17th, which includes the direct and consequential effects. And the 48.65 is the implied volatility that includes all of that. And then for the 356.30 on the but-for direct, I want to eliminate any consequential -- potential consequential effects, so I use 50.52.

Q Okay. Now, obviously as of August 7th, the implied volatility on August 17th didn't exist -- couldn't have existed; right?
A Well --
MR. PORRITT: I'm going to object to form.
THE WITNESS: I'm not sure what you're -- I mean, the whole concept is a but-for world. 312.90 didn't exist. I had to develop a price -- a but-for price and a but-for volatility.
BY MR. ROSSMAN:
Q Okay. So let me see if I understand what you've done here. Okay?
You've taken a model that Professor Heston did, okay, that extracts an implied volatility based on an assumption that the at-the-money straddle applies to all of the options for the same maturity. And that's how --
A I'm sorry --
Q -- he comes up with --
A Okay. Hold on. I was -- the screen is changing on me. Sorry.
Q Okay.
A It's flashing.

Q So -- we're looking at -- we're looking at Appendix 8. I think you have that in front of you; right?
A Well, we did -- I don't know why the screen was flashing all over the place. Okay. Now it's --
Q I thought you were looking on the paper. But I think we've got the screen up now.
A Yeah, but I -- it catches your attention from your peripheral vision when you see it --
Q That's fine.
A Okay.
Q So if I understand what you did here, okay, you first -- you start with implied volatility that Professor Heston supplies to you in the revalued fitted option value; right?
MR. PORRITT: Object to form.
THE WITNESS: Professor Heston made a calculation of implied volatility based on the ATM forward straddles, and I utilized that on a daily basis. It could be done literally minute by minute if necessary.
BY MR. ROSSMAN:
Q Okay. And the very first thing we should

observe is he assumes that the ATM forward straddle volatility is the same for all of the options of the same maturity, regardless of strike price; right?
MR. PORRITT: I'm going to object to form.
THE WITNESS: The -- you can see from the table that the implied volatility for any expiration is the same for the expiration dates. This refitted ATM forward straddle is an attempt to minimize any issues associated with bid-ask spreads, high cost of shorting, and any of the commonly observed distortions based on option price -- observed option prices.
BY MR. ROSSMAN:
Q Okay.
A Just trying to do -- trying to do an apples-to-apples comparison.
Q All right. So you're starting with implied volatility using the ATM straddle. If that implied volatility, in fact, does not apply across the curve, does not apply accurately to all the different strike prices, then your starting point is wrong; right?

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MR. PORRITT: Object to form --
THE WITNESS: Again, the issue is the -- the relationship. The -- you're trying to get an apples-to-apples comparison. So by using the refitted option value and using the same approach for the but-for fitted option value, you are accounting for and eliminating issues associated with bid-ask spreads, microstructure issues associated with options, the potential biases or whatever you might want to call them or distortions associated with options prices, you know, often referred to as "smiles" or "smirks," and it -- this is a method that compares apples to apples by, in essence, adjusting both the but-for and the revalued in the same manner.

And so the key is -- the key is putting them together to calculate the inflation or deflation as opposed to using prices where bid-ask spreads, costs of shorting, microstructure issues, illiquidity might cause there to be distortions in the bid-ask prices.

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And one of the things you can see, just in this table, is the reasonable -- this approach, when you look at inflation and sort of the linear relationships between the different options and different maturities -- linear only in the sense that they go up, they don't necessarily go up by the same amounts -- but unlike other approaches where you'd be all over the place and you've have huge spikes and kinks and all types of things, this provides a very reasonable approach using these -- what would be modeled prices, which is commonly used in securities litigation.

BY MR. ROSSMAN:

Q And now, Dr. Hartzmark, bid-ask -- bid-ask spread differences are a reality in the marketplace in which Tesla options trade; right?

A Yes.

Q And they can make a real material difference in the price paid or received by market participants for Tesla options; true?

A Bid-ask spreads are a cost of doing trading, yes.

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Q And the cost of shorting can have an impact on the value of options; right?

A That's correct as well, yes.

Q And the cost of shorting can change the relationship between put options and call options; right?

A Correct. That's -- that's why you want to try to eliminate that as much as possible.

Q Well, and there are other market microstructure issues that can affect the actual traded price of options; right?

A Yes.

Q Okay. And Professor Heston, in his analysis, he simply assumes all those things away; right?

A I'm not sure what you mean. He --

Q Well, he --

A By using the modeled refitted option values based on the actual information, and by using the but-for fitted, the idea is that the differences will account for issues associated with bid-ask spreads, illiquidities, short costs, and other microstructure issues.

Q But Professor Heston doesn't take into account in his starting point the revalued fitted

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option value. He doesn't take into account bid-ask spread, cost of shorting, or other micromarket structure -- market microstructure issues; correct?

MR. PORRITT: I'll object to form. Misrepresents Professor Heston's work.

THE WITNESS: Yeah, I mean, again, the key is do both of these incorporate the same -- do they both incorporate those issues in the same way so that they difference out? And it's my understanding that -- that when you difference them out, that this is the most reliable, reasonable, and robust way to calculate the difference between the but-for world and the actual world.

BY MR. ROSSMAN:

Q Okay. But just in terms of what he did, in the revalued fitted option value, you agree that Professor Heston's values don't take into account bid-ask spread, cost of shorting, or market microstructure; right?

MR. PORRITT: Object to form, Andrew. That's a gross misrepresentation.

THE WITNESS: Yeah, I can't comment

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on -- I know that -- again, that given Professor Heston and given his knowledge of options markets, which is second to none, that the nature of the approach that was proposed was to eliminate, to the extent possible, issues associated with, you know, large -- with large variation and option pricing caused by micro- -- we'll call them microsummarizing microstructure issues, and in this way, you can compare an apple to an apple and not have to compare an apple to an orange or two oranges that were, you know, based on very different worlds.

BY MR. ROSSMAN:

Q So if I understand what you did with respect to the stock prices themselves, okay, the common stock prices, you actually compared the actual traded prices of common stock on a minute-by-minute basis, right, to a theoretical or but-for price if you make the damage adjustments that you are opining should be made; right? That's what you did for stock prices?

A I'm confused. That was a lengthy question.

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Q It's not a hard question.

A I don't think it was -- minute by minute, you started with, and I'm trying to think what I did minute by minute.

Q Let me shorten up the question. I'll withdraw that question, Dr. Hartzmark.

For stock prices, you compared actual traded stock prices to but-for prices that you constructed in your damage reports; right?

A For stock prices for the damages, I used actual stock prices, correct.

Q Right.

And you compared them to but-for prices that you developed in your report; right?

A Well, that I calculated based on the model that is presented in the 169 pages of my report, yes.

Q That's not what you did with respect to option prices; right? You didn't take actual traded option prices and compare them directly to but-for option prices; right?

MR. PORRITT: I'm going to object to form.

THE WITNESS: Well, again, the issue of calculating but-for prices would

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have caused there to be issues associated with bid-ask spreads, shorting costs, other microstructure issues. This was a way, when making this comparison, to do that. Using modeled prices is quite common. I've done it many, many times, and it's a function of the markets.

BY MR. ROSSMAN:

Q Sir --

A I've never stated that the option market is the same as a stock market, and I don't think anybody else has. The option market is a derivatives market, and it has different characteristics. And this is a very reasonable, very reliable, very robust method, and I -- to estimate the difference in the prices. And that's the key, because we're trying to look at the difference in the price.

Q Well, in a damages report, what you're trying to do is you're trying to assess how much the price of the securities that you bought or sold in the class period was diverged from what the price should have been; right?

A You look and see how much the price is inflated or deflated relative to the actual price.

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Q Right. But what I'm -- all I'm asking you, Dr. Hartzmark, is in the case in the options, you didn't take actual traded option prices and compare them to but-for option prices. You instead took a model of theoretical options, and then compared them to other theoretical but-for options; right?

MR. PORRITT: I'll object to form.

THE WITNESS: Again --

BY MR. ROSSMAN:

Q Is that right?

A -- I've made it clear that you've had modeled prices based on actual data, and you've had but-for prices based on actual data so that you could compare this -- what is very difficult 20 -- or 2,000 -- more than 2,000 option series across the ten-day period. I think this is a reasonable, reliable, and robust method to look at the difference and estimate the inflation and the deflation precisely.

Q So what you did -- and, you know, maybe we can agree on this terminology -- you took modeled prices, which are the revalued fitted options value, right, and you compared them to other model prices; right?

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A To -- we -- we modeled the prices based on the Black-Scholes-Merton model and estimates of implied volatility, which allowed us to account for the various issues associated with options markets and microstructure of the options market. And by using the same Black-Scholes-Merton model on the but-for prices, we're able to eliminate those issues because they difference out.

Q Okay. But I'm asking you a fairly simple question, which I would think you could answer directly.

You took modeled prices for the revalue fitted option value, and then you compared them to but-for model prices in the other two panels: One has direct and consequential effects and the other just direct?

A Yeah. I mean, I have a call price of, for example, the top of 3 -- of 17 of 17 for the 460 strike of 36.69 as the refitted option value, the 36.06 as the but-for option value based on direct and consequential effects, and the difference between them is $0.64. And -- of -- that's the difference, yes. So I believe Dr. Heston -- Professor Heston explained his -- what he calls his "quantum," which is basically what I've done

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here.

Q You have no view on Professor Heston's quantum. You simply plug it into your calculations; right?

A Again, I have -- my view on Professor's quantum is that it is an appropriate method because it allows you to take out, by differencing issues, the microstructure effects to the best degree possible, and -- and I rely on that given that Professor Heston is, again, if not -- is second to none as it relates to options pricing with -- and options pricing theory.

Q Okay.

MR. ROSSMAN: All right. Let's take a quick break. I think I'm pretty close to done.

THE WITNESS: Okay.

MR. PORRITT: Yeah.

THE VIDEOGRAPHER: Off the record, 6:21 p.m.

(Recess from 5:21 p.m. to 5:40 p.m. CST)

THE VIDEOGRAPHER: Going back on the record, 6:40 p.m.

MR. ROSSMAN: Great. Can we start with just -- you have as Tab 25. Can we

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mark that as the next exhibit?

(Hartzmark Exhibit 379 marked.)

MR. ROSSMAN: Let me know when you've got that.

THE WITNESS: Okay.

BY MR. ROSSMAN:

Q Dr. Hartzmark, these are the numbers that you wrote down and calculated during the course of the deposition; is that right?

A Yes.

Q Okay. I just wanted to make sure we captured them, because you gave testimony about them as you were doing it.

MR. ROSSMAN: Okay. You can put that -- you can take that off the screen.

BY MR. ROSSMAN:

Q Now, could you turn quickly to your report on Page 106, and you'll see Table 6 there is titled "Disclosures with Potentially Confounding News."

Let me know when you're there.

A Okay. I am there.

Q And if I understand, what you did in this table is in order to determine whether confounding news had an impact on the price of the stock in

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this time period, you evaluated impact at that time on the trading price in 1 -- in a 1-minute interval and in 15-minute interval; correct?

A Yes. I wanted to eliminate, if present, confounding information. As I mentioned, it was very difficult on what -- oh, as I mentioned, it was very difficult because there was so much news going on. So this was a way to look at the 1- and 15-minute intervals to attempt to see if there were statistically significant movements following these particular potentially confounding disclosures.

Q And if we take, for example, the 12:17, "Saudi Arabia's Public Investment Fund builds $2 billion stake."

A Say that again. Where is this?

Q So top of the table, so 8/7, 12:17 p.m.

A Oh, okay. I thought you said 8/17. I'm sorry. Right.

Q Yeah. 8/7 at 12:17 p.m. That's the confusion.

We talked about this before, the press release and the -- I'm sorry -- the FT article reporting on the Saudi Arabia Public Investment Fund investment; right?